DESIGN SPACE DEVELOPMENT (DSD)

Activities and Results in AMODEUS-2

The work on Design Space Development (DSD) carried out at CCS in the course of AMODEUS-2 relates to the following TA objectives.

General Aim (A) *To establish a set of related frameworks for expressing different aspects of the design of user-system interaction.*

General Aim (C) *To assess how mediating expressions, modelling techniques and the substantive principles they convey may successfully be transferred to and used by the design community.*

Specific Objective (2) *The development of Design Rationale (DR), within which the considerations underlying design reasoning and choice can be explicated and utilised to determine what an interface should look like and how it should behave.*

Specific Objective (3) *The development of a classification of concepts relevant to the different types of design-oriented expression.*

Specific Objective (7) *To develop means of encapsulating expressions for successful transfer to designers, based upon the use of common exemplars.*

CCS joined the AMODEUS project at the start of AMODEUS-2. The goal of the work was to develop a broad and practical design support framework based on an understanding of the properties common to the design spaces of IT artefacts (cf. General Aim (A) and Specific Objective (3) of AMODEUS-2). During the three years of the project, work has gone through three broad phases, as follows:

In Year 1, the design support framework was developed conceptually through application to a large, realistic in-house design process, i.e. the design of an application-oriented spoken language dialogue system prototype (Bernsen 1993a, 1993b), as well as to shared AMODEUS-2 material (Bernsen 1993d). The result was a frame-based notation for explicitly representing an artefact as it develops in design space during design specification. The framework was named *COSITUE* after its analysis of design spaces as having, among others, the following aspects: Collaboration, Organisation, System, Interface, Task, User and user Experience (Bernsen 1993c, 1993e).

During Year 2, the framework was developed into its present format partly through application to shared AMODEUS-2 design material such as the ECOM and CERD cases (Bernsen and Ramsay 1994b, 1994c, Ramsay and Bernsen 1994), and partly through being used as an integral part of the RP5 information mapping methodology that was developed in the same period by CCS and Leuven (Verjans and Bernsen 1994). The COSITUE framework was re-named *Design Space Development* (or DSD), partly because design spaces are being analysed in terms of more aspects than the COSITUE aspects mentioned above, and partly because the framework came to integrate the representation of design space *structure, process* and *reasoning* (Bernsen 1994, Bernsen and Ramsay 1994a). Thus, a particular DSD frame represents the structure and contents of the design space at a certain point in time during artefact design. A series of DSD frames represents the development of the artefact design process. And DR frames selectively represent design reasoning

on particular design problems (cf. Specific Objective (2) of AMODEUS-2). The DR frame notation used by DSD is different from the notation used by another AMODEUS-2 DR approach, namely DSA/QOC.

During Year 3, DSD has been used to represent how the various AMODEUS-2 modelling approaches tackled a series of shared design problems with the CERD system (Ramsay and Bernsen 1995a, 1995b). However, three other developments have been more important to DSD development:

The first is the development towards transfer and assay of DSD. DSD was never taken up by RP4 during the life-time of AMODEUS-2. Instead, transfer and assay work on DSD has been done by the DSD developers themselves (cf. General Aim (C) and Specific Objective (7) of AMODEUS-2). DSD has been applied in a Danish industrial design project in which one of the DSD developers from CCS acted as consultant together with consultants from the modality theory and information mapping group at CCS (cf. RP5 of AMODEUS-2). The company's designer expressed the wish to use DSD himself in other design processes (Ramsay 1995). Further to the purpose of DSD transfer and assay, a DSD manual is in preparation and expected to be ready at the formal end of AMODEUS-2 (Bernsen, Dybkjær and Ramsay, in preparation).

The second development during Year 3 is theoretical. Work on comparing the DR representation used in the framework of DSD, with the DSA/QOC representation developed by colleagues in AMODEUS-2 quickly expanded to address the general, and unsolved, problem of how to design a practically useful DR representation. It thus became clear that no existing DR approach has yet been successfully transferred from research to industry. To seek an answer to the general problem just mentioned, Bernsen and Ramsay are preparing a study of the proper roles, aims and means of DR approaches to systems design support. The study is expected to be ready at the formal end of AMODEUS-2 (Bernsen and Ramsay, in preparation).

The third development during Year 3 is a hypertext implementation of DSD which we hope to have ready by the formal end of AMODEUS-2.

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